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Editorial – Dissection of Science

Politicians – in the sense of those who would make policy – seem to have it in for science. Commissions, councils, and advisory bodies, in Canada as in many other countries, have come into being in the last few years, with instructions to take a pragmatic look at scientists and their activities. Such groups have been busy dissecting "science" in every conceivable way and attempting to fit the pieces into categories of likenesses. But no matter how they dissect it they seem to wind up with a number of bits such as technology, and industrial research –which are hardly science at all– and to be left with an amorphous mass of true science which they can divide no further, a sort of Lucretius' atom of knowledge. This should not surprise us, for science –true science– is but weakly represented, if at all, among the membership of such groups: a true scientist and a politician are a world apart.

Science once meant knowledge; *scientific*, making knowledge. It has now come to mean new knowledge 'made' by the scientific method of hypothesis and experiment; or at most knowledge susceptible of verification by experiment. Your narrow-minded scientist may consider this the only true knowledge. Research, often synonymized with scientific method, by derivation means having another look –a small step from verification by experiment. While repetition resulting from inadequate literature (re)search is justly frowned upon, usually for sound economic reasons, it can cost more today to retrieve published information than to repeat the work. Repetition for confirmation of results which have been called in question is another matter and is often necessary.

Most research is an extension from previous research; if it has an avowed purpose this is sometimes referred to as applied research. The application of science or research is technology, which uses existing knowledge rather than making new. Research which breaks new ground and is not an extension from previous research cannot, by its nature, have a purpose beyond the creation of new knowledge. Indeed the term research is clearly inappropriate here and such work is often referred to as pure, basic, or fundamental science. None of these terms is without objection. Pure, because although most other work may be biassed by economic purpose it is unjust to imply that it is all impure. Basic, because to a physical scientist other work may then become acid. Fundamental, because of its implications to a biologist. The description 'free basic science' has recently become current for this type of

study, and free is certainly apposite, in both its meanings. For who can regulate where all are ignorant? And contrary to popular belief, basic discoveries are not usually expensive, though the minds that can make them are rare, and the rewards often wanting or posthumous. We might perhaps call this kind of study foundation science.

In the field of entomology, taxonomy, despite the slender support it gets, is close to foundation science, for although the structure, functions, and even relationships of undescribed species have been worked on, and molecular studies are sometimes reported without reference to a species, it is usually otherwise. The discovery and description of a "new" species is new knowledge, allowing the further extension of knowledge by the morphologist, physiologist, –and even the molecular biologist. If, as sometimes happens, a new species is discovered by chance, however, though foundation it is not science, in the derived sense. Often, of course, the existence of a new species can be hypothesized from known species; its discovery is then truly scientific –but no longer quite foundation.

Though technological virtuosity now allows us to erect a large building on a small base, if the edifice of science is to serve us well its foundations must outspan its superstructure. This is not now so. The economic rewards of technology have tempted it too far beyond its foundation science in too many directions –dust bowls, pollution, oil spills, thalidomide babies, the drug problem– are some of the consequences.

Politicians, policy, and police are words of common origin, collectively implying regulation, and a settled course of action. But foundation science is born of curiosity in the face of ignorance and leads none knows where. To regulate it is to destroy it. Direct policy for foundation science is thus a contradiction in terms. But in a favorable intellectual climate it thrives. And such an intellectual climate can be created. If policy would encourage technology it must first provide the climate for foundation science. Failing this it must restrain technology within the existing foundations of science. Advisory bodies concerned with science policy should devote less of their time to shuffling funds around among the varyingly squeaky wheels at various levels of technology and applied and industrial research, and more of it seeking ways and means of creating a climate for foundation science. Industry can afford its own research. Never since the Renaissance has the world been in such dire need of new thought at a basic level –of enlarged foundations of knowledge.

Brian Hocking